Let's Talk About Elastomeric Masks

Blog

I switched from wearing N95s to work to wearing elastomeric respirators (masks) with P100 filters early in mid-2022. Why? Because NO ONE at my workplace kept masking after the work mandate dropped in March or so of that year, and since work follows CDC guidance, people were wandering in on day 6 after being infected, and were almost certainly sill infectious. Don't get me wrong: N95s work well to protect you from COVID (and other airborne pathogens), but I wanted the better protection afforded by an elastomeric P100.

Let's Talk Cost

I put this up front, even before talking about what an elastomeric is, because a lot of folks don't have tons of money to keep themselves safe. This isn't "a pandemic of the unvaccinated," it's a pandemic of those without means. I'm privileged: I can afford masks and other things, but I understand a LOT of folks can't. The good news is that elastomeric masks can be a game-changer!

Keeping in mind that FIT is the most critical factor (more on that, below), you can get a high quality elastomeric for as little as $15 or so, like the 3M 6200. Taken care of properly, this mask and other elastomerics will typically last for years, and will also protect you if you have hobbies or need to do any work where you should have respiratory protection.

The basic 3M 2091 P100 filter for the 6200 goes for about $6-8/pair. How long the filters last depends on various factors, but essentially they can be used until they start clogging up, restricting the airflow, or get wet or are otherwise damaged. For use against COVID, this is often 3 to 6 months (but follow any manufacturer instructions!).

So, for an investment of about $15 for the mask and let's say new filters at $8/pair every quarter, a year's worth of HEPA-grade filtration (which is essentially the standard P100 filters are made to) would cost an individual about $47 for the first year, and $24/year after that for filters, because you only have to buy the mask once.

Now to compare with disposable N95s. Some folks believe that you can reuse N95s, others believe you can't or shouldn't. But let's assume you use at least one new mask every day. Right now, a 240-count pack of 3M Aura 9210+ N95 disposable respirators is $276 dollars on Amazon; if you bought smaller quantities, it would be more expensive. But let's figure about $1 per mask each day you need one. That adds up FAST, especially if you're trying to protect a whole family. And on top of it, while N95s are great, P100s are simply better and provide more protection (more on that below).

Also, while it's not exactly at the top of the heap in priorities these days, using elastomerics sends a LOT less waste to landfills vs. disposable masks.

The bottom line is that if you want protection from COVID exposure and don't have a lot of cash to burn, even the more expensive elastomerics ($50-70 range for the mask, about $10-12/pair for filters) would be a LOT less expensive AND provide better protection than disposable N95s.

What's an Elastomeric Mask?

So, what the heck IS an elastomeric? It's basically a mask made of rubber, silicone, and/or other materials that's reusable and has replaceable filters. A good elastomeric mask will last for years, and depending on use the cartridges can last for months before replacement. Elastomerics aren't new: they've been used for decades in all types of work applications where people need to filter out harmful particulates and even fumes: elastomerics are often used in welding, painting, woodworking, and many others fields. Elastomerics also come in half-face, which covers your nose and mouth, and full-face versions.

A LOT of manufacturers make elastomerics: 3M, Honeywell/North, MSA, GVS, Dentec, FloMask, EnvoMask, Moldex, Dräger, and more.

About Filters

As I mentioned, elastomerics typically have replaceable filters, either as cartridges, inserts, or "naked" filters that are just the filter material without a plastic case. Some companies, like Honeywell, make a huge selection of filters for different needs; others only have one or a few filter options.

One thing to keep in mind: as a general rule, filters are typically unique to a particular manufacturer. A Honeywell filter that fits their North-series masks won't fit 3M masks, and vice versa. So if you're looking at having multiple masks, say for your family members, that might be something to consider so you don't have to keep stock of different brand and incompatible filters.

The P100 Filter

The filter you'll hear most associated with elastomerics for use against COVID and other airborne pathogens is the P100. The P100 filters out at least 99.97% of airborne particles down to 0.3 microns and is also strongly resistant to oil. This is essentially the same filtration standard (minus oil resistance) for HEPA filters, which also remove 99.97% of airborne particles down to 0.3 microns. So, in essence, when you're using P100

filters, you're getting HEPA-grade filtration!

By contrast, an N95 is designed to filter out 95% of particles down to 0.3 microns. I want to emphasize that THIS IS NOT "BAD"!! N95s work extremely well, but – assuming a good fitting mask (more on that shortly) – P100 filters simply work better because they're designed to achieve a higher standard of filtration.

> *Please do NOT fall down the rabbit hole of "these masks can't filter out virions (individual virus) like SARS-CoV-2 that are only about 0.1 micron in size!" N95 and higher grade filters aren't just sieves: they use advanced technology to attract smaller particles than the gaps between fibers and have been shown to filter over 99% of particles down to 0.1 microns. Further, viruses often are carried in respiratory aerosols that you breathe out (ever seen someone vape?), which are considerably larger than the virus itself. Here's a great video explaining how N95 ad similar filtration works.*

I recently had an interesting "field test" opportunity when visiting someone who smokes marijuana in a state where it's legal. I hate the smell and the individuals don't mask, either (and thus are risk vectors for COVID), so I wore my N95 into the house, but also brought along my MSA Advantage 900 elastomeric with P100 filters. I could immediately smell the weed smoke in the N95. After switching over to the P100… there was near-zero smell. It was a very pronounced difference!

> *Note for all the folks preparing to pile on about particulates vs. odors – I know the difference; I'm strictly talking about filtering particulates here, okay? Also, for the people about to pile on about eye protection: we'll touch on that another time, okay? This post is about using elastomeric masks protecting your respiratory system! Stay on topic, eh?*

Would the N95 have protected me from any virus? Yes, at least for a time (eventually enough will get through to potentially infect you – your protection with an N95 isn't infinite in a risky setting). Did the P100 provide superior filtration and, thus, protection? Absolutely. Again, that's not because the N95 is "bad," it's because the P100 is designed to a higher/more stringent standard.

Good Fit Is EVERYTHING

This applies to ANY mask you wear: a good fit to your face is absolutely essential. A properly fitting KN95 is better than a poorly fitting elastomeric with P100 filters.

A few general tips:

- There should be NO gaps, anywhere, around the periphery of the mask, no matter if you're talking, turning your head, etc.
- Most elastomerics let you do a quick negative pressure check: cover up the filters and gently inhale – the mask should hold a vacuum and squeeze in toward your face a bit, and you shouldn't feel/hear any air seeping in.
- Periodically through the day check the tension on the straps: sometimes they give a bit and need to be adjusted. You don't have to put your head in a vice with strap tension – they just need to be tight enough to keep a good seal (again, including when you talk, turn your head, etc.).
- For the guys, I'm sorry: ya gotta shave or keep your beard & mustache within the confines of the mask so you can maintain a positive seal. Otherwise you can do the head-wrap technique.

Unfortunately, finding an elastomeric that fits well AND is sufficiently comfortable to wear for extended periods isn't always easy. Elastomerics are like shoes: masks by different manufacturers tend to fit differently, and a mask that works for you may not fit me at all, and vice versa. They also typically come in different sizes (mostly S/M/L), but not all manufacturers publish fit guides for all their masks, which can be super annoying. Just for context, I'm a 6 foot-1 inch tall, 220 lb guy, and medium-size masks seem to fit me the best. But you could be smaller and need a large, or bigger and need a small,

depending on the distance from the bottom of your chin (typically) to the bridge of your nose, and how wide your mouth is. I wish someone would come up with an app that could scan your face, check the shape against a database of elastomeric masks, and give you recommendations. But that doesn't – to the best of my knowledge – exist yet.

Another issue with fit is if you wear glasses. When wearing my North 7700 (my "benchmark" for fit), I can still use my regular prescription glasses without any problem, as the nose bridge fits over the top of the mask on my nose. But that's definitely not true with the MSA Advantage 900: the mask fits me just fine, but the top is too wide to accommodate my glasses, so they sit really high and I have to lower my head to use them – not good if you have to be in that position for very long.

One final consideration is the comfort of the neck strap. Most elastomerics have a "halo" head strap that goes over the crown of your head, and a neck strap that goes around the back of your neck. For me, the latter generally induces some neck strain that can lead to headaches. However, in some cases you can actually loop the neck strap through the lower part of the halo (thanks to ParentingMishmash on Twitter for this), which relieves the pressure on your neck while keeping the mask firmly in place.

So, finding a properly fitting eleastomeric can be a bit of trial and error. I'd recommend looking for a retailer(s) that has good return policies so you can send back any that don't fit.

Audibility

By "audibility" I mean how well (or poorly) others can hear you. One downside to most elastomerics is that they make it harder for others to hear you clearly, more so than through an N95. This generally isn't an insurmountable issue, but it's one you need to be aware of: you'll need to project a bit more and annunciate clearly. Some masks have speaking diaphragms that are supposed to help, but I've gotten mixed feedback from other elastomeric users on how effective these diaphragms are.

Source Control

This is another source (haha) of controversy: is it ethical to use a mask that has an exhaust valve? Or should you only use a mask that doesn't have one? Or is it situation dependent?

Most elastomerics do NOT have source control, meaning that when you exhale the mask has an exhaust valve that sends your breath out into the world beyond the mask, unfiltered. Masks with source control send your exhalation out through the same set of filters that screen incoming air for two-way filtration.

From the wearer's perspective, the main difference is that masks with an exhaust valve have less (or no) condensation buildup inside the mask. Source-controlled masks pretty much all have issues with condensation, to the point that you periodically may have to unmask and dump out the accumulated water: it's not a lot, but after half a day of wearing a source-controlled mask, I'd say about half to a full teaspoon of water is in the bottom of my mask. Your face behind the mask will also get a bit sweaty because the water vapor can't escape very well through the filters.

Now, some folks have stuck filter material inside masks with exhaust valves as DIY source control; that's a commendable action, but I doubt that mask would pass an OSHA test and I don't recommend relying on it if you're around anyone who's vulnerable. If you have a mask you really like that has an exhaust valve, the only real option if you want to "source control" it is to completely block the exhaust valve. Keep in mind, though, that will almost certainly reduce the life of your filters (source-controlled masks typically have larger filters).

Let's talk a minute about the source control ethics question. First, if you're going to be in any sort of environment where kids, elders, immunocompromised, or otherwise vulnerable folks may be present, you should ALWAYS use a source-controlled mask. Always.

If you work in an environment like I do where no one (NO ONE) else masks, I've come to the conclusion that I have no issue

anymore wearing a mask with an exhaust valve. I'm the lowest threat vector there, and at this point, going into the fourth year of this insanity, if they don't want to mask I'm not going to worry about it. Now, if work reimplemented a mask mandate, then I would use a source-controlled mask. But in this age of "you do you," if I'm more comfortable in a valved mask, I'll wear it without any guilt. The only exception would be if I knew I was positive/symptomatic and for some reason absolutely HAD to come into work: then I'd definitely wear a source-controlled mask.

What about on public transit, or in a store? That's a decision you'll have to make for yourself. All other things being equal, I'd choose a source-controlled mask.

My Mask Collection

So far (ha!), I have four elastomerics. I'll give a quick overview of each and my personal impressions. Note that I use P100 filters for all of them. I believe all of them come in S/M/L sizes, so check for fit guides!

Dentec Comfort-Air nxMD

The Dentec is a source-controlled mask made of rubber, and is pretty light at 181 g (medium size, with P100 filters). A lot of folks swear by this mask, but it simply doesn't fit me well at all and it can't pass a negative pressure check. Again, however, this does NOT mean it's a "bad" mask: it just doesn't fit my face, any better than Nike shoes fit my feet (whereas Asics do). But it does work great for many people!

Honeywell North 7700

The 7700 is a NON-source-controlled mask that is my "benchmark" for fit and general comfort. My medium

with P100 filters weighs 184 g. Unlike many other masks, the face piece is all silicone, making it softer and more pliable than rubber-based masks. This mask fits me extremely well and easily passes a negative pressure check and doesn't break seal no matter if I'm talking or whipping my head around. From the appearance, I also call this my "Darth Vader" mask, and I do a pretty fair impression of James Earl Jones when wearing it at work! There's no condensation buildup because of the exhaust valve; but that also means this mask (or the HM501T, below) would NOT be appropriate in any environment where you could potentially be a risk to vulnerable people.

> *What convinced me to switch to elastomeric P100s, and the North 7700 in particular, was this article describing how these masks have been used at the Texas Center for Infectious Disease (TCID), which treats tuberculosis patients.*

Honeywell North HM501T

The North HM501T is a NON-source-controlled mask that was designed to be light, and at 137 g (medium size, with the same P100 filters as used by the 7700) it's almost 50 g lighter than the 7700! That may not sound like much, but any weight on your face for extended periods of time is a lot more tiring than you'd think! Now, my initial impression of the HM501T was that it probably wouldn't fit me well, but after playing around with it a bit more, I decided my initial impression was wrong: it keeps a good seal while talking, moving my head about, and is quite light, and my glasses actually fit over the top of the mask just fine. The only problem for me is the neck strap, which at full extension on mine is still a bit tight, and I definitely can't do the loop-through-the-lower-halo trick mentioned above. However, it shouldn't be too much of a problem to figure

out a way to finagle an extender to solve that. And like with the 7700, the exhaust valve means there's very little/no issue with condensation buildup, although you don't want to use it in any environment where you could be exposing vulnerable folks.

Note that there are two versions of this mask: the HM501T, which has a regular strap arrangement, and the HM502T, which has a strap arrangement that lets you drop the mask from your face without removing the halo.

MSA Advantage 900

The Advantage 900 is a source-controlled mask that also weighs in at a light 137 g (medium size with P100 filters). This is the most expensive mask in this lineup at around $60 (without filters), and is also the only one with a speaking diaphragm. This mask fits me well, easily passes a negative pressure check, and was my "marijuana test" P100 mask, successfully filtering out weed smoke (and anything else in the air!) over the course of a few hours-long weed smoke immersions.

I haven't tried the loop-through-the-halo mod on this one yet, although the straps are long enough that this should be no problem to do. This mask, like the HM502T, is a "drop down," which I found is actually quite handy: the neck strap is integrated with the halo strap, so when you unclasp the neck strap, the mask drops down from your face, while the halo still is on your head. So if you need to wear a helmet or other headgear you can drop the mask without taking off your headgear. If you want to take a quick drink, you can hold your breath, drop the mask, sip, replace the mask, blow out the room air, and swallow. The drop-down feature makes it easy.

The Advantage 900 is the least "intimidating" mask in this group with its turquoise color. Also, MSA says the 900 is appropriate for MRI environments, as the only metal is the aluminum in the speech diaphragm; the mask contains no ferrous metal.

3 thoughts on “Let’s Talk About Elastomeric Masks”

S
January 2, 2023 at 1:01 am
Permalink

I have a full-face & a few half-face 3m 6000s. Do you know of an exhaust add-on for them? Thank you :)

Log in to Reply

Mike Hicks Post author
January 29, 2023 at 11:31 pm
Permalink

Unfortunately, no – I don’t have any 3M masks, but I suspect if you search their site (if you haven’t already), you might be able to pin that down.

Log in to Reply

maddox
February 13, 2023 at 7:32 pm
Permalink

there are a couple of etsy sellers that make them: https://www.etsy.com/listing/1268637045/exhale-filter-for-3m-respirator and https://www.etsy.com/listing/950463621/3m-6000-series-exhalation-vent-filter

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